

LISTS OF SPECIES

Angiosperms, tree species in tropical forests of southern Eastern Ghats, Tamil Nadu, India

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Abstract

We provide a list of tree species enumerated from a total of 60 ha area sampled in the tropical forests of southern Eastern Ghats, Tamil Nadu, India. A total of 272 tree species (≥ 30 cm girth at breast height) representing 181 genera and 62 families were recorded. Euphorbiaceae with 25 species was the most speciose family, followed by Moraceae (17 species), Rubiaceae (17), Rutaceae (14) and Lauraceae (12). At the generic level, *Ficus* dominated with 12 species, followed by *Diospyros* (9), *Acacia* (6), *Terminalia* (6) and *Grewia* (5). Anthropogenic activities such as hill cultivation, construction of dams, roads, buildings, etc. affect the already fragmented southern Eastern Ghats, and underline the need for effective conservation measures.

Introduction

Tropical forests cover 7 % of the earth's land surface, but harbour more than half of the world's species (Wilson 1988), and are currently disappearing at an overall rate of 0.8 to 2 % per year (May and Stumpf 2000; Sagar et al. 2003). In developing countries like India, dependence on forests is inevitable. Therefore, the pressure on forests by the ever-increasing population is logarithmic (Jayakumar et al. 2002). The Indian subcontinent, with its rich biodiversity, is one of the 12 mega-diversity countries in the world. The Eastern Ghats, Western Ghats, Himalayas, north-eastern hills and Andamans constitute important biodiversity areas of India. Rapidly shrinking biodiversity levels have raised the concern that species loss could eventually lead to ecosystem collapse (Naeem 2002) and ecologists are intensely studying the relationship between biodiversity and ecosystem function (Potvin and Gotelli 2008); a decade of research has highlighted generally a positive relationship (Hooper et al. 2005; Balvanera et al. 2006).

The disappearance of tropical forests comes at a time when our knowledge on their structure and dynamics is woefully inadequate (Hubbell and Foster 1992). Understanding of forest processes is necessary for assessment of potential impacts, the amelioration of effects of disturbance, optimization of productivity and rehabilitation of ecosystem (Congdon and Herbohn 1993).

Hence, the conservation of biological diversity has become a major concern, for much of society and for many government agencies at all levels (Kaya and Raynal 2001). Documenting basic patterns of biodiversity is fundamental for prioritizing areas for conservation and management action (Villasenor et al. 2007). Tropical trees are especially interesting subjects, as there is much species diversity (Condit et al. 1996, Chittibabu and Parthasarathy 2000). The Eastern Ghats of India is a broken chain of hills that runs almost parallel to east coast of India covering four states viz. Orissa, Andhra Pradesh, Tamil Nadu and Karnataka. We provide a check list of tree species inventoried from the under-studied tropical forests of southern Eastern Ghats.

Materials and methods

Study area

Inventory of tree species was carried out in six major hill complexes of southern Eastern Ghats namely, Bodamalai (BM), Chitteri (CH), Kalrayan (KA), Kolli hills (KO), Pachaimalai (PM) and Shervarayan hills (SH) (Figure 1). These hill complexes fall in the districts of Villupuram, Salem, Namakkal, Trichy, Perambalur, Erode, Dharmapuri and Thiruvannamalai in the state of Tamil Nadu, India. They are composed of masses of charnockite associated with gneisses and varied metamorphic rocks (Chittibabu and Parthasarathy 2000). The southern Eastern Ghats harbour five major forest types - tropical wet evergreen, semi-evergreen, mixed deciduous, dry deciduous and

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thorn forests (Figure 2). Tribal settlements are common in all these hills. The tribal people of southern Eastern Ghats are called ‘*Malayalees*’. The hilly terrain and the surrounding plains of southern Eastern Ghats are densely populated. The climate data of Salem, the nearest station to the study sites for 20 years (1988-2007) obtained from India Meteorological Department, Government of India, reveals that the mean annual temperature is 28.3 °C and the mean annual

rainfall is 1058 mm. The mean annual rainy days for the same period are 61 days. In southern Eastern Ghats, the ever-increasing human population and settlements, fuel wood extraction, herding of cattle/ goats inside the forests, quarrying, location of factories near by forests, construction of buildings, roads, dams, etc. and hill cultivation lead to degradation of forest landscape and ultimately some portions of forest habitat are threatened (Figure 3).

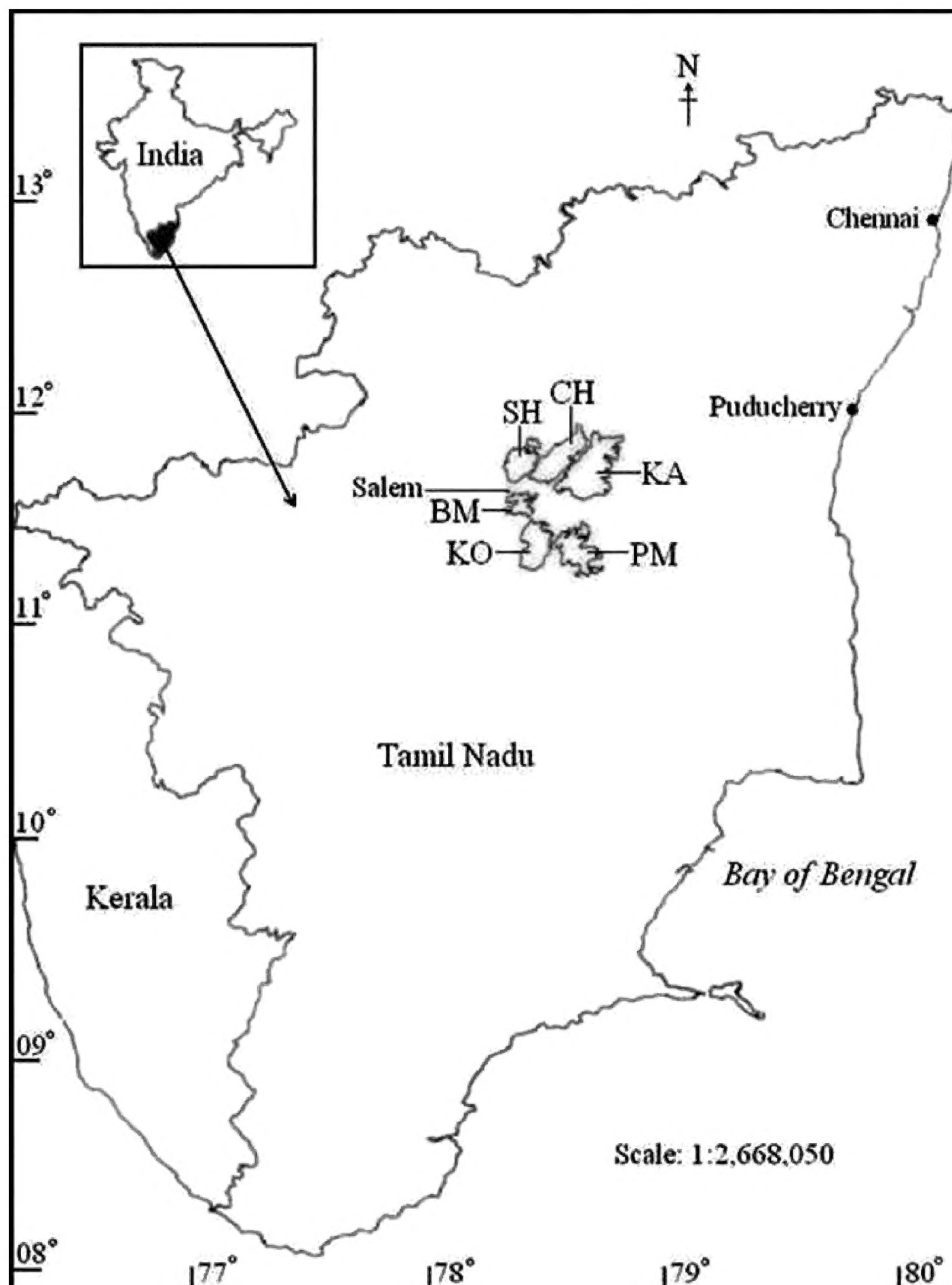


Figure 1. Map showing the study area- the six major hill complexes of southern Eastern Ghats: Bodamalai (BM), Chitteri (CH), Kalrayan (KA), Kolli hills (KO), Pachaimalai (PM) and Shervarayan hills (SH)

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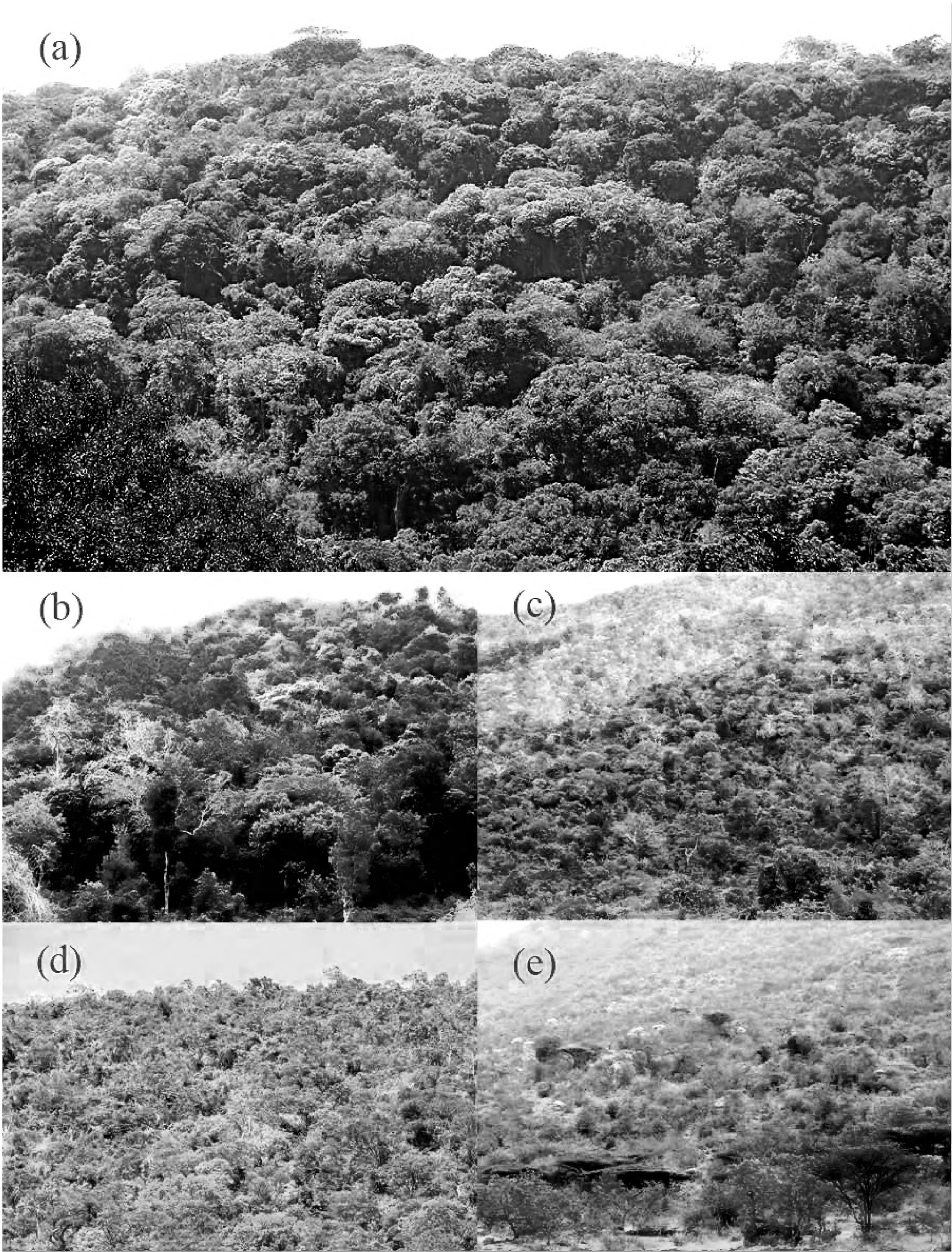


Figure 2. a) Tropical wet evergreen forest (Kolli hills); b) Semi-evergreen forest (Kalrayan hills); c) Mixed deciduous forest (Chitteri hills); d) Dry deciduous forest (Kalrayan hills); e) Thorn forest (Kolli hills). Photo by L. Arul Pragasam & N. Parthasarathy

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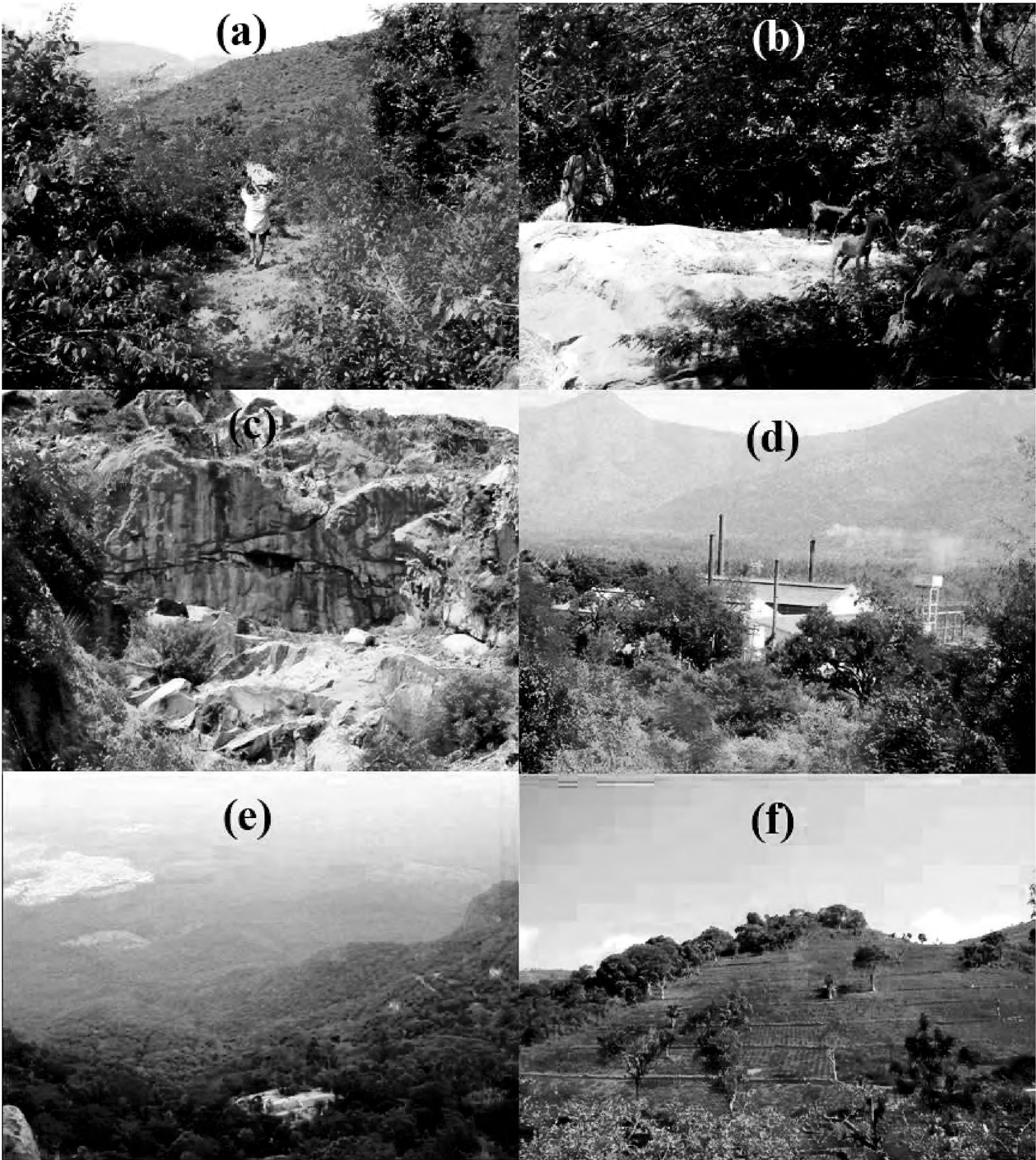


Figure 3. Anthropogenic impacts: a) fuel wood extraction; b) herding goats; c) quarrying; d) factory near forest; e) construction of buildings; f) hill cultivation. Photo by L. Arul Pragasam

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Data collection

The entire stretch of southern Eastern Ghats was divided into 6.25 km \times 6.25 km grids. A total of 120 grids were obtained from the six hill complexes of southern Eastern Ghats. In each grid, all live trees \geq 30 cm girth at breast height (gbh) were enumerated from a belt transect of 0.5 ha (5 m \times 1 km) area. To facilitate inventory, each transect was sub-divided into fifty 5 m \times 20 m quadrats. Floras such as Hooker (1879), Gamble and Fischer (1915-1935), Trimen (1974), Nair and Henry (1983), Henry et al. (1987; 1989) Dassanayake and Fosberg (1987) and Matthew (1991) were used for identification of trees. Voucher specimens were collected and confirmed with the herbarium of our department and French Institute (IFP), Puducherry, and also online herbarium catalogue of Royal Botanic Gardens, Kew. They are deposited in the herbarium of Department of Ecology and Environmental Sciences, Pondicherry University.

Results and Discussion

A total of 272 tree species representing 181 genera and 62 families were recorded from the six hill complexes of southern Eastern Ghats (Table 1). Pictures of selected species are provided in Figures 4 - 17. Forty-two per cent of the family and 73 % of the genera are represented by single species. The most speciose families include Euphorbiaceae with 25 species, followed by Moraceae (17 species), Rubiaceae (17), Rutaceae (14) and Lauraceae (12). The most speciose genera include *Ficus* (12 species), followed by *Diospyros* (9), *Acacia* (6), *Terminalia* (6) and *Grewia* (5). Of the 272 species recorded, 59 % are evergreen species, 25 % are deciduous and 16 % are brev-deciduous. A total of 11 % of species are thorny. In southern Eastern Ghats, the most abundant tree species include *Euphorbia antiquorum* (Euphorbiaceae), *Acacia planifrons* (Mimosaceae) and *Acacia horrida* (Mimosaceae) in tropical thorn forests, *Albizia amara* (Mimosaceae), *Chloroxylon swietenia* (Flindersiaceae) and *Anogeissus latifolia* (Combretaceae) in dry deciduous forests, *Gyrocarpus asiaticus* (Hernandiaceae), *Commiphora caudata* (Burseraceae) and *Givotia rottleriformis*

(Euphorbiaceae) in mixed deciduous forests, *Syzygium cumini* (Myrtaceae), *Nothopegia heyneana* (Anacardiaceae) and *Celtis philippensis* (Ulmaceae) in tropical semi-evergreen forests and *Memecylon edule* (Melastomataceae), *Neolitsea scrobiculata* and *Alseodaphne semicarpifolia* var. *semicarpifolia* in tropical wet evergreen forests.

Whereas in the Western Ghats of peninsular India, the most abundant species in a 30 ha plot of tropical wet evergreen forest in Anamalais include, *Drypetes longifolia* (Euphorbiaceae), *Reinwardtiadendron anamallayanum* (Meliaceae), *Poeciloneuron indicum* (Clusiaceae), *Dipterocarpus indicus* (Dipterocarpaceae) and *Dimocarpus longan* (Sapindaceae) (Ayyappan and Parthasarathy 1999), while *Kydia calycina* (Malvaceae), *Lagerstroemia microcarpa* (Lythraceae), *Terminalia crenulata* (Combretaceae), *Anogeissus latifolia* (Combretaceae), *Tectona grandis* (Verbenaceae) and *Cassia fistula* (Caesalpiniaceae) formed the dominant species in the 50 ha plot of tropical deciduous forest in Mudumalai (Sukumar et al. 1992). The enumerated species richness of 272 trees species in 60 ha area of southern Eastern Ghats forests is greater when compared to a few large-scale (contiguous plot) inventories of trees (\geq 30 cm gbh) in other tropical forests: 226 species in 50 ha plot of Barro Colorado Island, Panama; 211 species in 50 ha plot at Huai Kha Khaeng, Thailand; 164 species in 25 ha plot at Sinharaja, Sri Lanka (Condit et al. 2000); 148 species in 30 ha plot at Varagalaia, Anamalais, India (Ayyappan and Parthasarathy 1999); 103 species in 28 ha plot at Uppangala, central Western Ghats, India (Pascal and Pelissier 1996); 63 species in 50 ha plot at Mudumalai, India (Condit et al. 2000); but lesser than the 996 species encountered in 52 ha plot at Lambir, Peninsular Malaysia and 673 species in 50 ha plot at Pasoh, Malaysia (Condit et al. 2000). Documenting the patterns of species diversity and their distribution creates a good database, useful for implementing better management and conservation of tropical forests, particularly so for the patchy hill complexes of southern Eastern Ghats.

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Table 1. Total list of tree species enumerated from 120 belt transects of 0.5 ha area in six hill complexes of southern Eastern Ghats, Tamil Nadu, India. (BD: brevi-deciduous; D: deciduous; E: evergreen; T: thorny; NT: non-thorny).

| Species/ Family | Plant type | T/NT | Voucher no. |
|--|------------|------|-------------|
| Alangiaceae | | | |
| <i>Alangium salviifolium</i> (L.f.) Wang. | D | T | 5128 |
| Anacardiaceae | | | |
| <i>Buchanania axillaris</i> (Desr.) Ramam. | D | NT | 5013 |
| <i>Buchanania lanzan</i> Spreng. | D | NT | 5424 |
| <i>Lannea coromandelica</i> (Houtt.) Merr. | D | NT | 5149 |
| <i>Mangifera indica</i> L. | BD | NT | 5392 |
| <i>Nothopogia heyneana</i> (Hook.f.) Gamble | E | NT | 5282 |
| <i>Nothopogia racemosa</i> (Dalz.) Ramam. | E | NT | 5096 |
| <i>Rhus mysorensis</i> G. Don | E | T | 5169 |
| <i>Semecarpus anacardium</i> L.f. | BD | NT | 5102 |
| <i>Spondias pinnata</i> (L.f.) Kurz | BD | NT | 5170 |
| Annonaceae | | | |
| <i>Alphonsea sclerocarpa</i> Thw. | E | NT | 5488 |
| <i>Annona cherimola</i> Mill. | E | NT | 5451 |
| <i>Annona squamosa</i> L. | E | NT | 5429 |
| <i>Miliusa eriocarpa</i> Dunn | E | NT | 5465 |
| <i>Polyalthia cerasoides</i> (Roxb.) Bedd. Nakulsi | D | NT | 5054 |
| Apocynaceae | | | |
| <i>Alstonia scholaris</i> (L.) R.Br. | E | NT | 5396 |
| <i>Holarrhena pubescens</i> Wall. | E | NT | 5517 |
| <i>Plumeria rubra</i> L. | D | NT | 5196 |
| <i>Wrightia tinctoria</i> (Roxb.) R.Br. | D | NT | 5077 |
| Aquifoliaceae | | | |
| <i>Ilex wightiana</i> Wall. ex Wight | E | NT | 5168 |
| Araliaceae | | | |
| <i>Schefflera stellata</i> (Gaertn.) Harms | D | NT | 5244 |
| Arecaceae | | | |
| <i>Borassus flabellifer</i> L. | E | NT | 5165 |
| <i>Caryota urens</i> L. | E | NT | 5321 |
| Asteraceae | | | |
| <i>Vernonia arborea</i> Buch.-Ham. | E | NT | 5318 |
| Bignoniaceae | | | |
| <i>Dolichandrone arcuata</i> (Wight) Clarke | D | NT | 5242 |
| <i>Dolichandrone atrovirens</i> (Heyne ex Roth) Spangue | D | NT | 5363 |
| <i>Spathodea campanulata</i> Beauv. | E | NT | 5468 |
| <i>Stereospermum colais</i> (Buch.-Ham. ex Dillw.) Mabberley | E | NT | 5255 |
| Bischofiaceae | | | |
| <i>Bischofia javanica</i> Blume | D | NT | 5263 |
| Bombacaceae | | | |
| <i>Bombax ceiba</i> L. | D | NT | 5334 |
| Burseraceae | | | |
| <i>Boswellia serrata</i> Roxb. ex Coleb. | D | NT | 5173 |
| <i>Canarium strictum</i> Roxb. | D | NT | 5264 |
| <i>Commiphora berryi</i> (Arn.) Engler | D | T | 5256 |
| <i>Commiphora caudata</i> (Wight & Arn.) Engler | D | T | 5020 |
| <i>Garuga pinnata</i> Roxb. | D | NT | 5039 |
| Caesalpiniaceae | | | |
| <i>Bauhinia purpurea</i> L. | E | NT | 5010 |

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|---|------------|------|-------------|
| <i>Bauhinia racemosa</i> Lam. | D | NT | 5136 |
| <i>Cassia didymobotrya</i> Fresn. | D | NT | 5209 |
| <i>Cassia fistula</i> L. | D | NT | 5015 |
| <i>Cassia siamea</i> Lam. | E | NT | 5233 |
| <i>Delonix regia</i> (Boj. ex Hook.) Rafin. | BD | NT | 5251 |
| <i>Hardwickia binata</i> Roxb. | D | NT | 5202 |
| <i>Tamarindus indica</i> L. | BD | NT | 5108 |
| Capparaceae | | | |
| <i>Capparis grandis</i> L. | E | NT | 5420 |
| <i>Crateva magna</i> (Lour.) DC. | D | NT | 5502 |
| Celastraceae | | | |
| <i>Cassine glauca</i> (Rottb.) Kuntze | E | NT | 5139 |
| <i>Euonymus indicus</i> Heyne ex Roxb. | E | NT | 5120 |
| <i>Maytenus emarginata</i> (Willd.) Ding Hou | E | NT | 5398 |
| <i>Pleurostyliia opposita</i> (Wall.) Alston | E | NT | 5098 |
| Combretaceae | | | |
| <i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr. | D | NT | 5008 |
| <i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn. | BD | NT | 5480 |
| <i>Terminalia bellirica</i> (Gaertn.) Roxb. | BD | NT | 5069 |
| <i>Terminalia chebula</i> Retz. | BD | NT | 5070 |
| <i>Terminalia coriacea</i> (Roxb.) Wight & Arn. | BD | NT | 5072 |
| <i>Terminalia crenulata</i> Roth | BD | NT | 5408 |
| <i>Terminalia paniculata</i> Roth | BD | NT | 5073 |
| Cordiaceae | | | |
| <i>Cordia domestica</i> Roth | BD | NT | 5142 |
| <i>Cordia macleodii</i> (Griff.) Hook.f. & Thoms. | BD | NT | 5496 |
| <i>Cordia obliqua</i> Willd. | BD | NT | 5175 |
| <i>Ehretia pubescens</i> Benth. | E | NT | 5181 |
| Cupressaceae | | | |
| <i>Callitris rhomboidea</i> R. Br. ex Rich. | E | NT | 5432 |
| Dipterocarpaceae | | | |
| <i>Shorea roxburghii</i> G. Don | E | NT | 5105 |
| Ebenaceae | | | |
| <i>Diospyros barberi</i> Ramaswami | E | NT | 5023 |
| <i>Diospyros ebenum</i> Koen. | E | NT | 5024 |
| <i>Diospyros ferrea</i> (Willd.) Bakh. var. <i>buxifolia</i> (Rottb.) Bakh. | E | NT | 5025 |
| <i>Diospyros humilis</i> Bourd. | E | NT | 5382 |
| <i>Diospyros malabarica</i> (Desr.) Kostel. | E | NT | 5027 |
| <i>Diospyros melanoxylon</i> Roxb. | E | NT | 5030 |
| <i>Diospyros montana</i> Roxb. | D | T | 5087 |
| <i>Diospyros neilgerrensis</i> (R. Wight) Kosterm. | E | NT | 5304 |
| <i>Diospyros ovalifolia</i> Wight | E | NT | 5177 |
| Elaeocarpaceae | | | |
| <i>Elaeocarpus serratus</i> L. | E | NT | 5267 |
| Erythroxylaceae | | | |
| <i>Erythroxylum monogynum</i> Roxb. | BD | NT | 5031 |
| Euphorbiaceae | | | |
| <i>Agrostistachys borneensis</i> Becc. | E | NT | 5346 |
| <i>Aleurites moluccana</i> (L.) Willd. | D | NT | 5216 |
| <i>Antidesma menasu</i> Kurz | E | NT | 5296 |
| <i>Antidesma zeylanicum</i> Lam. | E | NT | 5390 |
| <i>Bridelia crenulata</i> Roxb. | D | T | 5319 |
| <i>Cleistanthus collinus</i> Benth. ex Hook.f. | D | NT | 5141 |

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|--|------------|------|-------------|
| <i>Croton laccifer</i> L. | E | NT | 5324 |
| <i>Drypetes roxburghii</i> (Wall.) Hurusawa | E | NT | 5220 |
| <i>Drypetes sepiaria</i> (Wight & Arn.) Pax & Hoffm. | E | NT | 5088 |
| <i>Epiprinus mallotiformis</i> (Muell.-Arg.) Croizat | E | NT | 5269 |
| <i>Euphorbia antiquorum</i> L. | E | T | 5236 |
| <i>Euphorbia nivulia</i> Buch.-Ham. | D | T | 5032 |
| <i>Excoecaria robusta</i> Hook.f. | E | NT | 5370 |
| <i>Givotia rottleriformis</i> Griff. | D | NT | 5145 |
| <i>Glochidion ellipticum</i> Wight | E | NT | 5455 |
| <i>Glochidion velutinum</i> Wight | E | NT | 5460 |
| <i>Macaranga indica</i> Wight | E | NT | 5378 |
| <i>Mallotus intermedius</i> (Baill.) Balakr. | E | NT | 5439 |
| <i>Mallotus philippensis</i> (Lam.) Muell.-Arg. | E | NT | 5245 |
| <i>Mallotus stenanthus</i> Muell.Arg. | E | NT | 5158 |
| <i>Manihot glaziovii</i> Muell.Arg. | E | NT | 5046 |
| <i>Margaritaria indica</i> (Dalz.) Airy Shaw | E | NT | 5150 |
| <i>Phyllanthus emblica</i> L. | BD | NT | 5287 |
| <i>Phyllanthus polyphyllus</i> Willd. | D | NT | 5426 |
| <i>Sapium insigne</i> (Royle) Benth. | D | NT | 5248 |
| Flacourtiaceae | | | |
| <i>Casearia elliptica</i> Willd. | E | NT | 5137 |
| <i>Casearia rubescens</i> Dalz. | E | NT | 5391 |
| <i>Flacourtia indica</i> (Burm.f.) Merr. | E | T | 5198 |
| <i>Flacourtia jangomas</i> (Lour.) Raeusch. | E | T | 5373 |
| <i>Scolopia crenata</i> (Wight & Arn.) Clos | E | T | 5063 |
| Flindersiaceae | | | |
| <i>Chloroxylon swietenia</i> DC. | D | NT | 5019 |
| Hernandiaceae | | | |
| <i>Gyrocarpus asiaticus</i> Willd. | D | NT | 5222 |
| Lauraceae | | | |
| <i>Alseodaphne semicarpifolia</i> Nees var. <i>angustifolia</i> Meissner | E | NT | 5259 |
| <i>Alseodaphne semicarpifolia</i> Nees var. <i>semecarpifolia</i> | E | NT | 5331 |
| <i>Beilschmiedia bourdilloni</i> Brandis | E | NT | 5261 |
| <i>Cinnamomum malabatrums</i> (Burm.f.) Blume | E | NT | 5301 |
| <i>Litsea deccanensis</i> Gamble | E | NT | 5118 |
| <i>Litsea glutinosa</i> (Lour.) C.Robinson | E | NT | 5306 |
| <i>Litsea oleoides</i> (Meisner) Hook.f. | E | NT | 5224 |
| <i>Litsea stocksii</i> (Meisner) Hook.f. | E | NT | 5307 |
| <i>Neolitsea cassia</i> (L.) Kosterm. | E | NT | 5051 |
| <i>Neolitsea scrobiculata</i> (Meisner) Gamble | E | NT | 5280 |
| <i>Persea macarantha</i> Nees Kosterm. | E | NT | 5206 |
| <i>Phoebe lanceolata</i> Nees | E | NT | 5358 |
| Lecythidaceae | | | |
| <i>Careya arborea</i> Roxb. | D | NT | 5155 |
| Leeaceae | | | |
| <i>Leea indica</i> (Burm.f.) Merr. | E | NT | 5273 |
| Loganiaceae | | | |
| <i>Strychnos nux-vomica</i> L. | BD | NT | 5153 |
| <i>Strychnos potatorum</i> L.f. | D | NT | 5066 |
| Lythraceae | | | |
| <i>Lagerstroemia parviflora</i> Roxb. | D | NT | 5041 |
| Melastomataceae | | | |
| <i>Memecylon edule</i> Roxb. | E | NT | 5275 |

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|--|------------|------|-------------|
| <i>Memecylon grande</i> Retz. | E | NT | 5049 |
| <i>Memecylon lushingtonii</i> Gamble | E | NT | 5277 |
| <i>Memecylon parvifolium</i> Thwaites | E | NT | 5205 |
| Meliaceae | | | |
| <i>Aglaia elaeagnoidea</i> (Juss.) Benth. var. <i>courtallensis</i> (Gamble) K.K.N. Nair | E | NT | 5294 |
| <i>Aglaia jainii</i> M.V.Viswan. & K.Ramach. | E | NT | 5330 |
| <i>Azadirachta indica</i> A.Juss. | BD | NT | 5133 |
| <i>Chukrasia tabularis</i> A.Juss. | E | NT | 5239 |
| <i>Cipadessa baccifera</i> Miq. | E | NT | 5084 |
| <i>Melia azedarach</i> L. | BD | NT | 5423 |
| <i>Melia dubia</i> Cav. | BD | NT | 5469 |
| <i>Soymida febrifuga</i> (Roxb.) A.Juss. | E | NT | 5208 |
| <i>Toona ciliata</i> M.Roem. | E | NT | 5328 |
| <i>Trichilia connaroides</i> (Wight & Arn.) Bentvelzen | E | NT | 5162 |
| <i>Walsura trifolia</i> (A.Juss.) Harms | E | NT | 5172 |
| Meliosmaceae | | | |
| <i>Meliosma pinnata</i> (Roxb.) Maxim. subsp. <i>arnottiana</i> (Wight) Beus. | E | NT | 5315 |
| <i>Meliosma simplicifolia</i> (Roxb.) Walp. subsp. <i>pungens</i> (Wight & Arn.) Beus. | E | NT | 5440 |
| <i>Meliosma simplicifolia</i> (Roxb.) Walp. subsp. <i>simplicifolia</i> | E | NT | 5316 |
| Mimosaceae | | | |
| <i>Acacia chundra</i> (Roxb. ex Rottl.) Willd. | D | T | 5226 |
| <i>Acacia farnesiana</i> (L.) Willd. | D | T | 5411 |
| <i>Acacia ferruginea</i> DC. | D | T | 5003 |
| <i>Acacia horrida</i> (L.f.) Willd. | D | T | 5228 |
| <i>Acacia leucophloea</i> (Roxb.) Willd. | D | T | 5113 |
| <i>Acacia planifrons</i> Wight & Arn. | D | T | 5230 |
| <i>Albizia amara</i> (Roxb.) Boivin | BD | NT | 5005 |
| <i>Albizia chinensis</i> (Osbeck) Merr. | D | NT | 5427 |
| <i>Albizia lebbeck</i> (L.) Benth. | BD | NT | 5007 |
| <i>Albizia odoratissima</i> (L.f.) Benth. | D | NT | 5215 |
| <i>Dichrostachys cinerea</i> (L.) Wight & Arn. | D | T | 5422 |
| Moraceae | | | |
| <i>Antiaris toxicaria</i> (Pers.) Lesch. | D | NT | 5333 |
| <i>Artocarpus heterophyllus</i> Lam. | E | NT | 5298 |
| <i>Artocarpus hirsutus</i> Lam. | E | NT | 5498 |
| <i>Ficus amplissima</i> J.E. Smith | BD | NT | 5034 |
| <i>Ficus beddomei</i> King | BD | NT | 5178 |
| <i>Ficus benghalensis</i> L. | BD | NT | 5037 |
| <i>Ficus drupacea</i> Thunb. var. <i>pubescens</i> (Roth) Corner | BD | NT | 5375 |
| <i>Ficus exasperata</i> Vahl | BD | NT | 5584 |
| <i>Ficus hispida</i> L.f. | BD | NT | 5365 |
| <i>Ficus microcarpa</i> L.f. | BD | NT | 5091 |
| <i>Ficus mollis</i> Vahl | BD | NT | 5144 |
| <i>Ficus nervosa</i> Heyne ex Roth | BD | NT | 5116 |
| <i>Ficus racemosa</i> L. | BD | NT | 5476 |
| <i>Ficus religiosa</i> L. | BD | NT | 5504 |
| <i>Ficus virens</i> Ait. | BD | NT | 5325 |
| <i>Streblus asper</i> Lour. | E | NT | 5225 |
| <i>Streblus taxoides</i> (Heyne ex Roth) Kurz | E | T | 5342 |
| Moringaceae | | | |
| <i>Moringa concanensis</i> Nimmo ex Gibs. | E | NT | 5151 |

LISTS OF SPECIES

| Species/ Family | Plant type | T/NT | Voucher no. |
|---|------------|------|-------------|
| Myristicaceae | | | |
| <i>Myristica dactyloides</i> Gaertn. | E | NT | 5210 |
| Myrsinaceae | | | |
| <i>Ardisia solanacea</i> Roxb. | E | NT | 5431 |
| <i>Maesa indica</i> (Roxb.) DC. | E | NT | 5045 |
| <i>Rapanea wightiana</i> (Wall. ex DC.) Mez | E | NT | 5389 |
| Myrtaceae | | | |
| <i>Eugenia thwaitesii</i> Duthie | E | NT | 5353 |
| <i>Psidium guajava</i> L. | E | NT | 5380 |
| <i>Syzygium cumini</i> (L.) Skeels | E | NT | 5067 |
| Ochnaceae | | | |
| <i>Ochna obtusata</i> DC. | D | NT | 5286 |
| Oleaceae | | | |
| <i>Chionanthus mala-elengi</i> (Dennst.) P.S.Green | E | NT | 5082 |
| <i>Chionanthus ramiflora</i> Roxb. | E | NT | 5433 |
| <i>Chionanthus zeylanica</i> L. | E | NT | 5018 |
| <i>Ligustrum perrottetii</i> DC. | E | NT | 5044 |
| Papilionaceae | | | |
| <i>Butea monosperma</i> (Lam.) Taub. | D | NT | 5484 |
| <i>Dalbergia latifolia</i> Roxb. | BD | NT | 5197 |
| <i>Dalbergia paniculata</i> Roxb. | BD | NT | 5021 |
| <i>Erythrina stricta</i> Roxb. | D | T | 5182 |
| <i>Erythrina suberosa</i> Roxb. | D | T | 5485 |
| <i>Erythrina variegata</i> L. | D | NT | 5487 |
| <i>Pongamia pinnata</i> (L.) Pierre | BD | NT | 5058 |
| <i>Pterocarpus marsupium</i> Roxb. | BD | NT | 5123 |
| Pittosporaceae | | | |
| <i>Pittosporum napaulense</i> (DC.) Rehder & Wilson | E | NT | 5053 |
| <i>Pittosporum neelgherrense</i> Wight & Arn. | E | NT | 5441 |
| Poaceae | | | |
| <i>Bambusa arundinacea</i> (Retz.) Roxb. | E | NT | 5081 |
| Proteaceae | | | |
| <i>Grevillea robusta</i> A.Cunn. | E | NT | 5270 |
| Rhamnaceae | | | |
| <i>Maesopsis eminii</i> Engler | E | NT | 5311 |
| <i>Ziziphus mauritiana</i> Lam. | BD | T | 5188 |
| <i>Ziziphus xylopyrus</i> (Retz.) Willd. | BD | T | 5112 |
| Rosaceae | | | |
| <i>Eriobotrya japonica</i> (Thunb.) Lindl. | E | NT | 5454 |
| <i>Prunus ceylanica</i> (Wight) Miq. | E | NT | 5288 |
| Rubiaceae | | | |
| <i>Benkara malabarica</i> (Lam.) Tirvengadam | E | NT | 5254 |
| <i>Canthium dicoccum</i> (Gaertn.) Teijsm. & Binn. var. <i>dicoccum</i> | E | NT | 5014 |
| <i>Canthium dicoccum</i> (Gaertn.) Teijsm. & Binn. var. <i>umbellata</i> (Wight) Sant. & Merch. | E | NT | 5265 |
| <i>Catunaregam spinosa</i> (Thumb.) Tiruvengadam | D | T | 5190 |
| <i>Coffea arabica</i> L. | E | NT | 5438 |
| <i>Gardenia resinifera</i> Roth | E | NT | 5038 |
| <i>Haldina cordifolia</i> (Roxb.) Ridsdale | E | NT | 5167 |
| <i>Hymenodictyon orixense</i> (Roxb.) Mabblerly | D | NT | 5185 |
| <i>Ixora pavetta</i> Andr. | E | NT | 5464 |
| <i>Lasianthus truncatus</i> Beddome | E | NT | 5043 |
| <i>Mitragyna parvifolia</i> (Roxb.) Korth. | D | NT | 5050 |

LISTS OF SPECIES

| Species/ Family | Plant type | T/NT | Voucher no. |
|---|------------|------|-------------|
| <i>Morinda pubescens</i> J.E. Smith | E | NT | 5194 |
| <i>Psychotria elongata</i> (Wight) Hook.f. | E | NT | 5444 |
| <i>Psychotria flavida</i> Talbot | E | NT | 5371 |
| <i>Randia candolleana</i> Wight & Arn. | E | NT | 5193 |
| <i>Tarenna asiatica</i> (L.) Kuntze | E | NT | 5343 |
| <i>Wendlandia thyrsoides</i> (Schultes) Steud. | E | NT | 5448 |
| Rutaceae | | | |
| <i>Aegle marmelos</i> (L.) Correa | D | T | 5126 |
| <i>Atalantia monophylla</i> (L.) Correa | E | T | 5079 |
| <i>Atalantia racemosa</i> Wight & Arn. | E | T | 5132 |
| <i>Citrus medica</i> L. | E | T | 5086 |
| <i>Clausena dentata</i> (Willd.) M.Roem. | D | NT | 5114 |
| <i>Euodia lunu-ankenda</i> (Gaertn.) Merr. | E | NT | 5397 |
| <i>Glycosmis mauritiana</i> (Lam.) Tanaka | E | NT | 5494 |
| <i>Glycosmis pentaphylla</i> (Retz.) DC. | E | NT | 5092 |
| <i>Limonia acidissima</i> L. | D | NT | 5117 |
| <i>Murraya koenigii</i> (L.) Spreng. | D | NT | 5381 |
| <i>Murraya paniculata</i> (L.) Jack | E | NT | 5409 |
| <i>Naringi crenulata</i> (Roxb.) Nicolson | D | T | 5279 |
| <i>Pamburus missionis</i> (Wight) Swingle | E | T | 5407 |
| <i>Pleiospermium alatum</i> (Wall. ex Wight & Arn.) Swingle | E | T | 5442 |
| Salicaceae | | | |
| <i>Salix tetrasperma</i> Roxb. | E | NT | 5445 |
| Santalaceae | | | |
| <i>Santalum album</i> L. | E | NT | 5100 |
| Sapindaceae | | | |
| <i>Allophylus serratus</i> (Roxb.) Kurz | E | NT | 5130 |
| <i>Dimocarpus longan</i> Lour. | E | NT | 5499 |
| <i>Filicium decipiens</i> (Wight & Arn.) Thw. | E | NT | 5156 |
| <i>Lepisanthes senegalensis</i> (Juss. Ex Poir.) Leenh. | E | NT | 5463 |
| <i>Lepisanthes tetraphylla</i> (Vahl.) Radlk. | E | NT | 5336 |
| <i>Sapindus emarginatus</i> Vahl. | BD | NT | 5101 |
| <i>Schleichera oleosa</i> (Lour.) Oken | D | NT | 5061 |
| Sapotaceae | | | |
| <i>Chrysophyllum roxburghii</i> G.Don | E | NT | 5300 |
| <i>Madhuca longifolia</i> (Koen.) Macbr. var. <i>longifolia</i> | E | NT | 5357 |
| <i>Manilkara hexandra</i> (Roxb.) Dubard | E | NT | 5479 |
| <i>Mimusops elengi</i> L. | E | NT | 5121 |
| Simaroubaceae | | | |
| <i>Ailanthus excelsa</i> Roxb. | D | NT | 5127 |
| Solanaceae | | | |
| <i>Solanum erianthum</i> D.Don | E | NT | 5361 |
| Sterculiaceae | | | |
| <i>Firmiana colorata</i> (Roxb.) R.Br. | D | NT | 5257 |
| <i>Helicteres isora</i> L. | E | NT | 5095 |
| <i>Hildegardia populifolia</i> (Roxb.) Schott & Endl. | D | NT | 5507 |
| <i>Pterospermum canascens</i> Roxb. | BD | NT | 5509 |
| <i>Pterospermum reticulatum</i> Wight & Arn. | D | NT | 5212 |
| <i>Pterospermum xylocarpum</i> (Gaertn.) Sant. & Wagh | BD | NT | 5338 |
| <i>Sterculia foetida</i> L. | BD | NT | 5249 |
| <i>Sterculia urens</i> Roxb. | D | NT | 5180 |
| <i>Sterculia villosa</i> Roxb. ex DC. | E | NT | 5107 |

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| Species/ Family | Plant type | T/NT | Voucher no. |
|--|------------|------|-------------|
| Symplocaceae | | | |
| <i>Symplocos cochinchinensis</i> (Lour.) Moore | E | NT | 5291 |
| Tiliaceae | | | |
| <i>Grewia laevigata</i> Vahl. | E | NT | 5369 |
| <i>Grewia orbiculata</i> Rottl. | E | NT | 5505 |
| <i>Grewia tenax</i> (Forssk.) Fiori | E | NT | 5520 |
| <i>Grewia tiliaefolia</i> Vahl. | E | NT | 5201 |
| <i>Grewia villosa</i> Willd. | E | NT | 5462 |
| Ulmaceae | | | |
| <i>Celtis philippensis</i> Blanco | E | NT | 5237 |
| <i>Celtis tetrandra</i> Roxb. | E | NT | 5219 |
| <i>Celtis timorensis</i> Spanoghe | E | NT | 5232 |
| <i>Holoptelea integrifolia</i> (Roxb.) Planch. | D | NT | 5253 |
| <i>Trema orientalis</i> (L.) Blume | E | NT | 5483 |
| Vacciniaceae | | | |
| <i>Vaccinium neilgherrense</i> Wight | E | NT | 5446 |
| Verbenaceae | | | |
| <i>Callicarpa tomentosa</i> (L.) Murr. | E | NT | 5352 |
| <i>Gmelina arborea</i> Roxb. | D | NT | 5040 |
| <i>Premna latifolia</i> Roxb. var. <i>mollissima</i> (Roth) Clarke | E | NT | 5060 |
| <i>Premna tomentosa</i> Roxb. | E | NT | 5160 |
| <i>Tectona grandis</i> L.f. | D | NT | 5161 |
| <i>Vitex altissima</i> L.f. | E | NT | 5075 |
| <i>Vitex negundo</i> L. | E | NT | 5495 |

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Figure 4. a) *Acacia chundra* (Mimosaceae); b) *Acacia horrida* (Mimosaceae); c) *Acacia leucophloea* (Mimosaceae); d) *Aglaia elaeagnoidea* var. *courtallensis* (Meliaceae); e) *Aglaia jainii* (Meliaceae); f) *Agrostistachys borneensis* (Euphorbiaceae). Photo by L. Arul Pragasan & N. Parthasarathy.

LISTS OF SPECIES

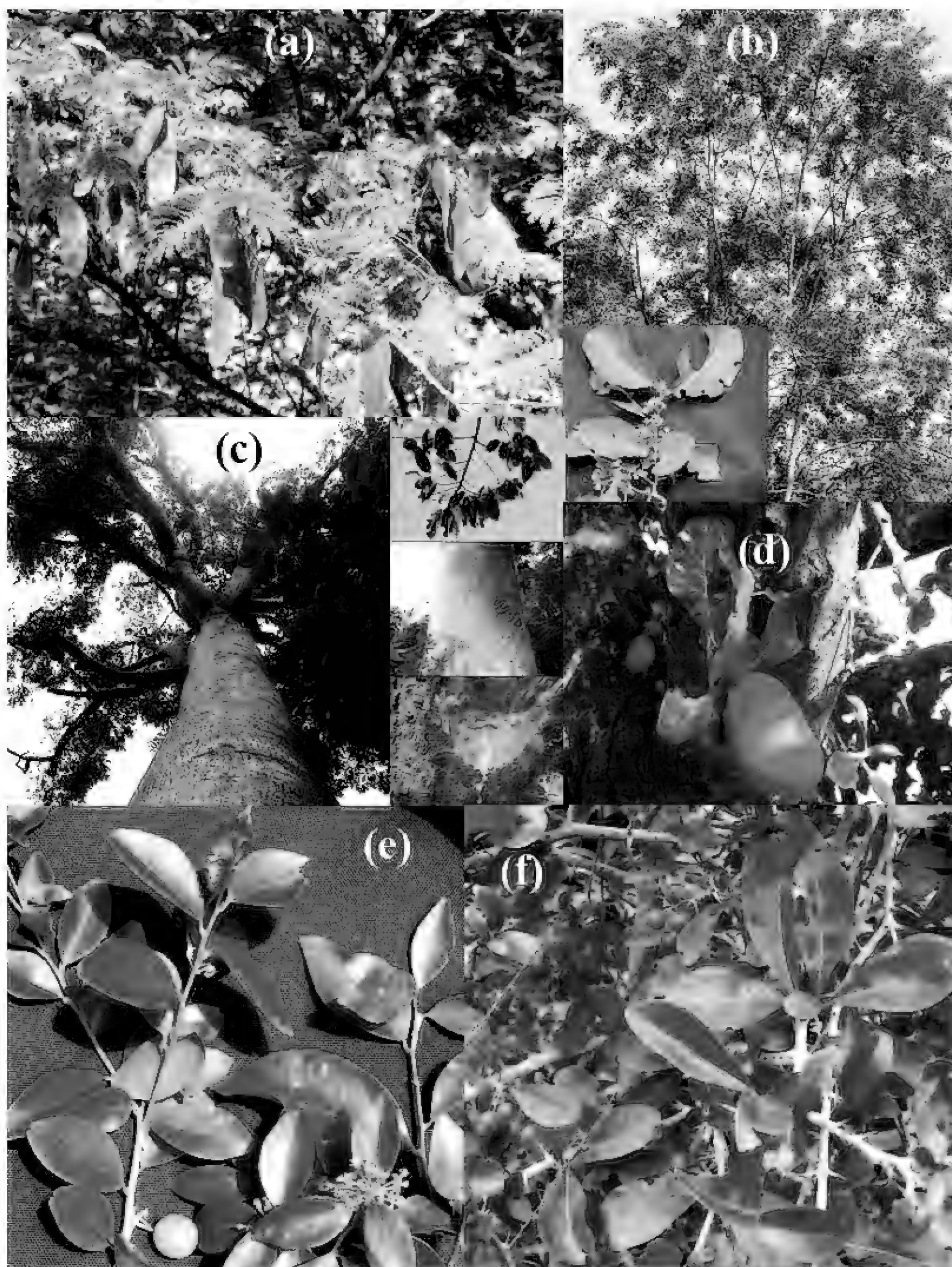


Figure 5. a) *Albizia amara* (Mimosaceae); b) *Anogeissus latifolia* (Combretaceae); c) *Antiaris toxicaria* (Moraceae); d) *Artocarpus heterophyllus* (Moraceae); e) *Atalantia monophylla* (Rutaceae); f) *Benkara malabarica* (Rubiaceae). Photo by L. Arul Pragasam.

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Figure 6. a) *Boswellia serrata* (Burseraceae); b) *Buchanania axillaris* (Anacardiaceae); c) *Callicarpa tomentosa* (Verbenaceae); d) *Canarium strictum* (Burseraceae); e) *Caryota urens* (Arecaceae); f) *Catunaregam spinosa* (Rubiaceae). Photo by L. Arul Pragasam.

LISTS OF SPECIES

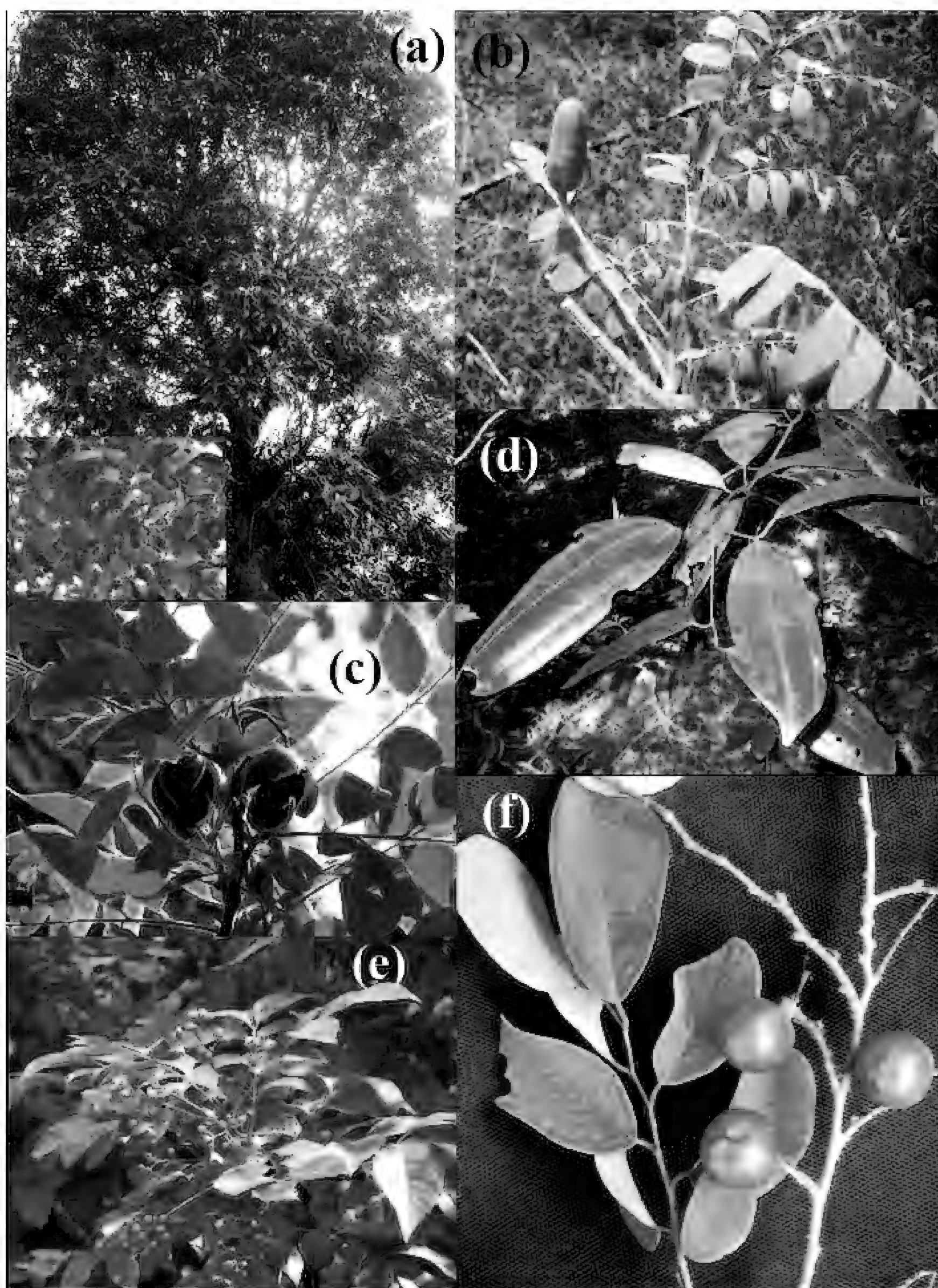


Figure 7. a) *Celtis philippensis* (Ulmaceae); b) *Chloroxylon swietenia* (Flindersiaceae); c) *Chukrasia tabularis* (Meliaceae); d) *Cinnamomum malabatrums* (Lauraceae); e) *Cipadessa baccifera* (Meliaceae); f) *Cleistanthus collinus* (Euphorbiaceae). Photo by L. Arul Pragasam.

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Figure 8. a) *Commiphora berryi* (Burseraceae); b) *Commiphora caudata* (Burseraceae); c) *Cordia obliqua* (Cordiaceae); d) *Dimocarpus longan* (Sapindaceae); e) *Diospyros melanoxylon* (Ebenaceae); f) *Diospyros ovalifolia* (Ebenaceae). Photo by L. Arul Pragasam.

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Figure 9. a) *Dolichandrone arcuata* (Bignoniaceae); b) *Drypetes roxburghii* (Euphorbiaceae); c) *Ehretia pubescens* (Cordiaceae); d) *Erythrina stricta* (Papilionaceae); e) *Erythroxylum monogynum* (Erythroxylaceae); f) *Eugenia thwaitesii* (Myrtaceae). Photo by L. Arul Pragasan.

LISTS OF SPECIES

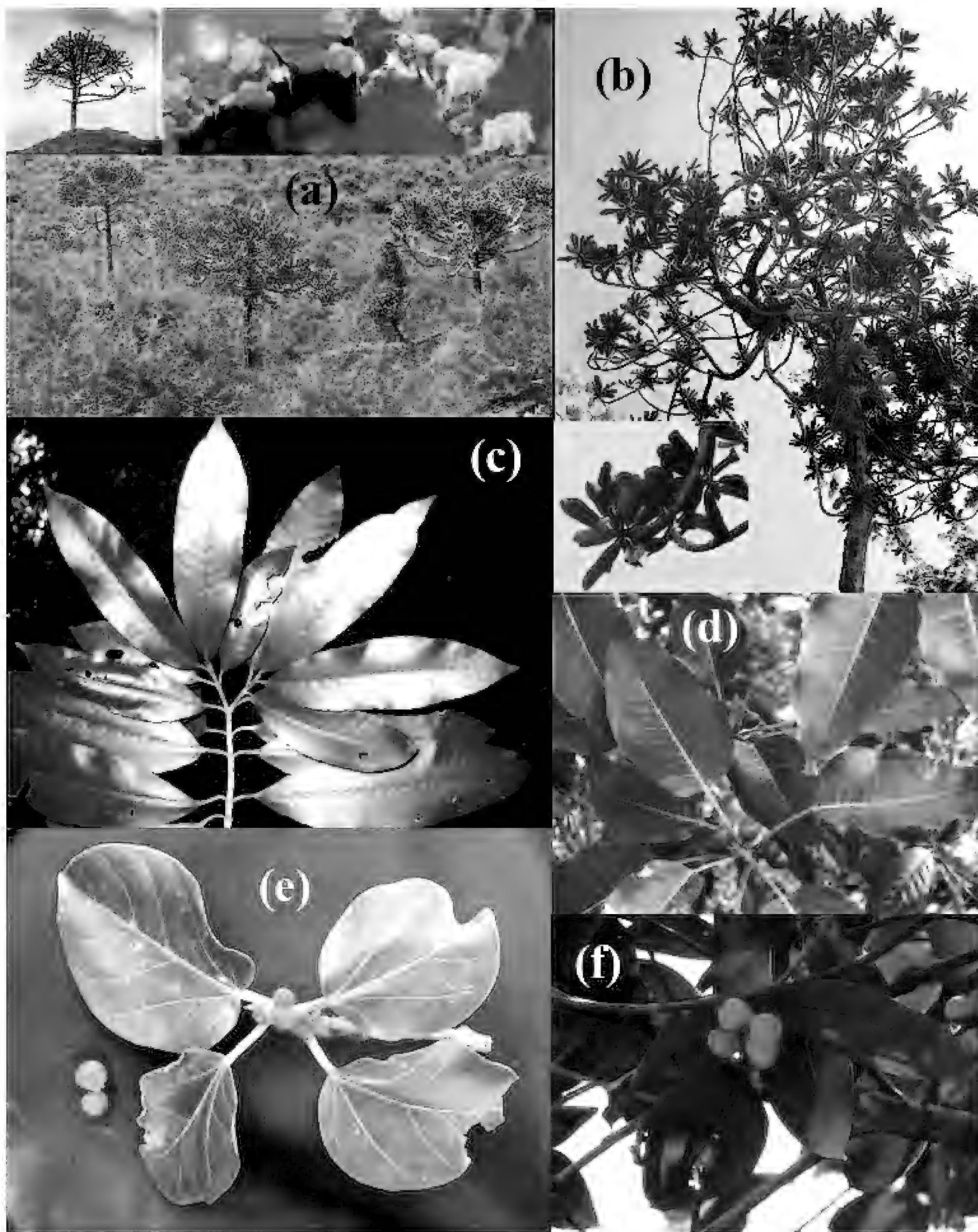


Figure 10. a) *Euphorbia antiquorum* (Euphorbiaceae); b) *Euphorbia nivulia* (Euphorbiaceae); c) *Excoecaria robusta* (Euphorbiaceae); d) *Ficus beddomei* (Moraceae); e) *Ficus benghalensis* (Moraceae); f) *Ficus drupacea* var. *pubescens* (Moraceae). Photo by L. Arul Pragasam.

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Figure 11. a) *Ficus hispida* (Moraceae); b) *Ficus microcarpa* (Moraceae); c) *Ficus nervosa* (Moraceae); d) *Filicium decipiens* (Sapindaceae); e) *Gardenia resinifera* (Rubiaceae). Photo by L. Arul Pragasan.

LISTS OF SPECIES

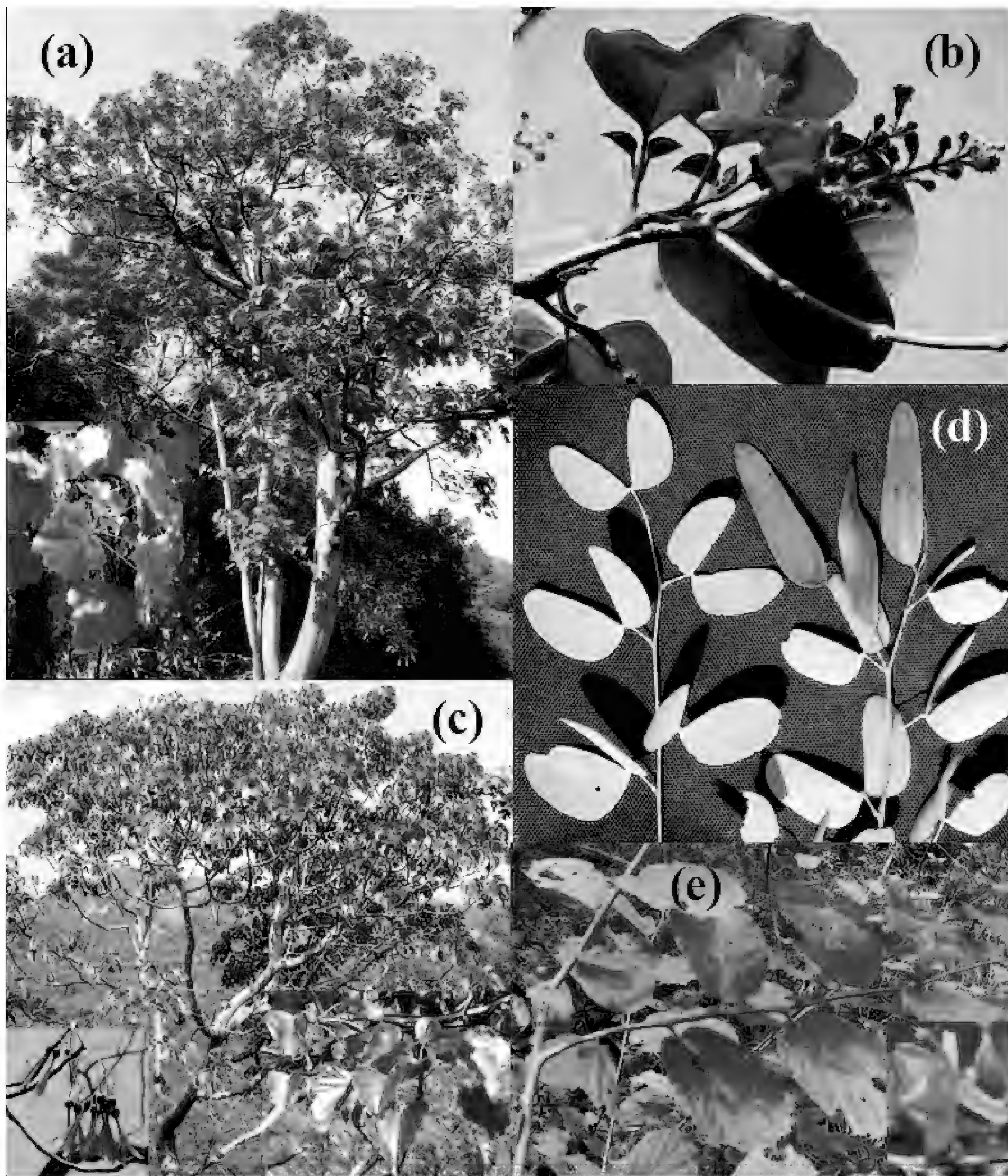


Figure 12. a) *Givotia rottleriformis* (Euphorbiaceae); b) *Gmelina arborea* (Verbenaceae); c) *Gyrocarpus asiaticus* (Hernandiaceae); d) *Hardwickia binata* (Caesalpiniaceae); e) *Helicteres isora* (Sterculiaceae). Photo by L. Arul Pragasan.

LISTS OF SPECIES

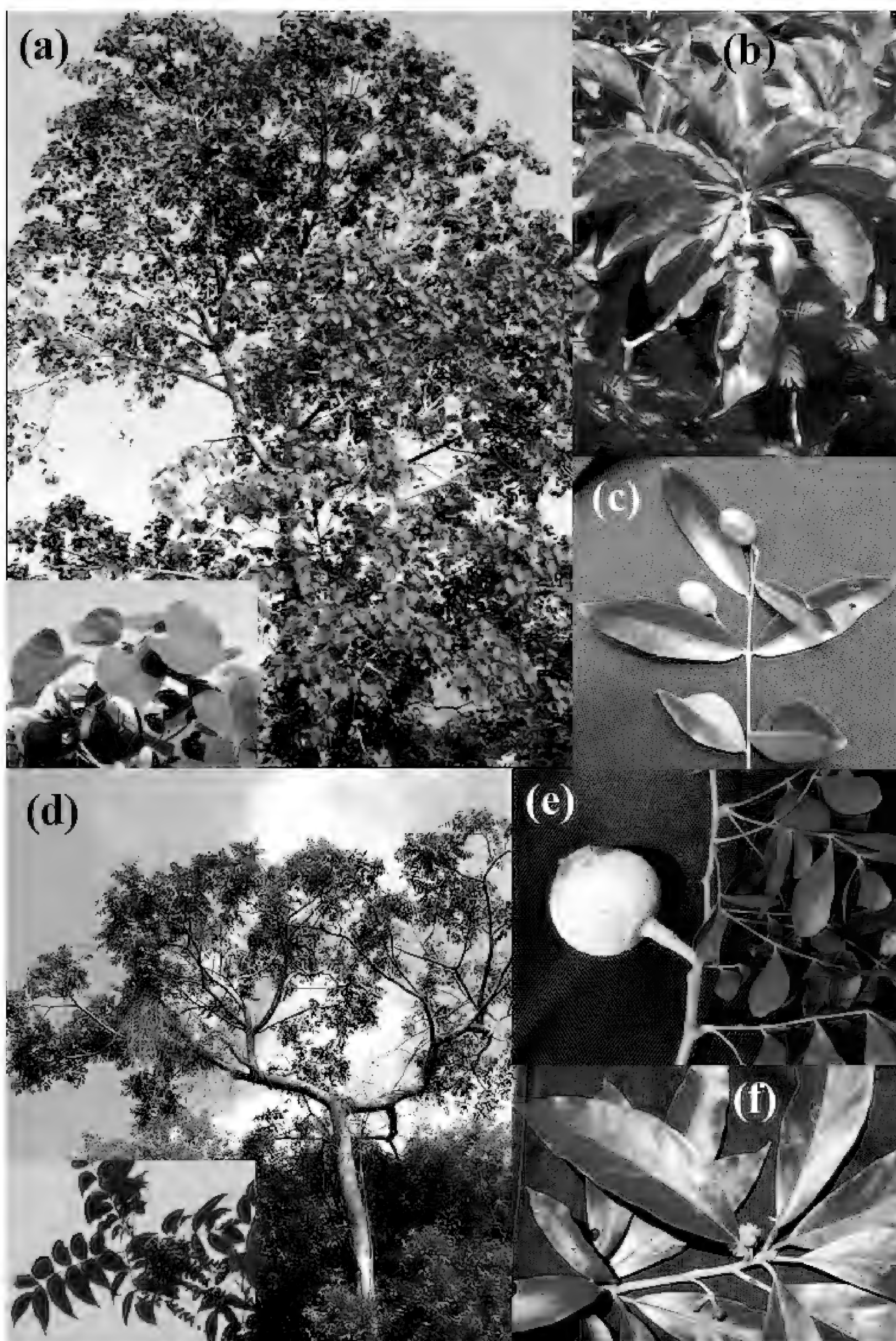


Figure 13. a) *Hildegardia populifolia* (Sterculiaceae); b) *Hymenodictyon orixense* (Rubiaceae); c) *Lagerstroemia parviflora* (Lythraceae); d) *Lannea coromandelica* (Anacardiaceae); e) *Limonia acidissima* (Rutaceae); f) *Litsea deccanensis* (Lauraceae). Photo by L. Arul Pragasam.

LISTS OF SPECIES

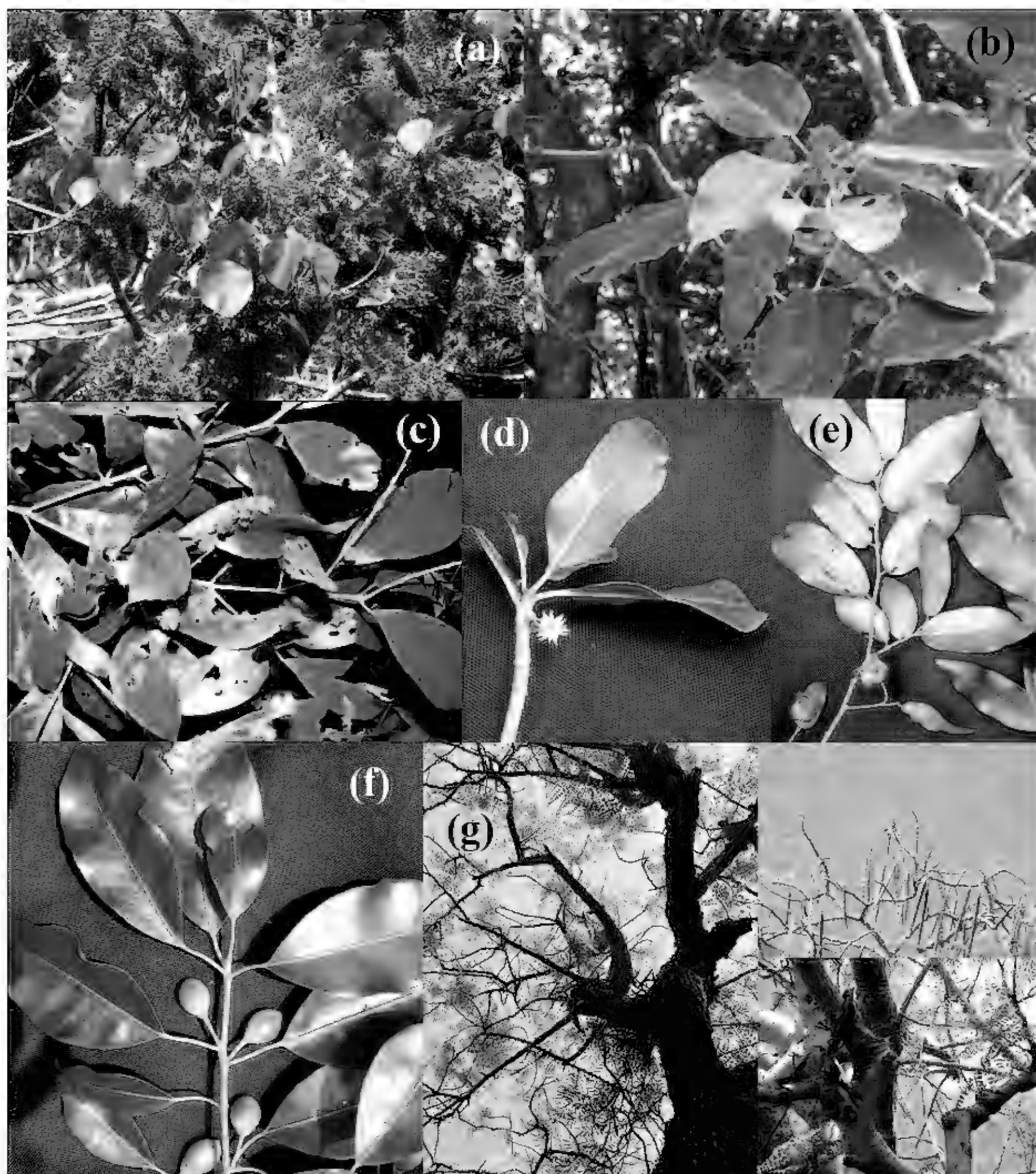


Figure 14. a) *Macaranga indica* (Euphorbiaceae); b) *Mallotus philippensis* (Euphorbiaceae); c) *Mallotus stenanthus* (Euphorbiaceae); d) *Manilkara hexandra* (Sapotaceae); e) *Miliusa eriocarpa* (Annonaceae); f) *Mimusops elengi* (Sapotaceae); g) *Moringa concanensis* (Moringaceae). Photo by L. Arul Pragasam.

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Figure 15. a) *Myristica dactyloides* (Myristicaceae); b) *Neolitsea scrobiculata* (Lauraceae); c) *Phyllanthus polyphyllus* (Euphorbiaceae); d) *Pittosporum neelgherrense* (Pittosporaceae); e) *Pleiospermium alatum* (Rutaceae); f) *Polyalthia cerasoides* (Annonaceae). Photo by L. Arul Pragasan & N. Parthasarathy.

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Figure 16. a) *Premna tomentosa* (Verbenaceae); b) *Prunus ceylanica* (Rosaceae); c) *Pterocarpus marsupium* (Papilionaceae); d) *Rhus mysorensis* (Anacardiaceae); e) *Santalum album* (Santalaceae); f) *Sapindus emarginatus* (Sapindaceae). Photo by L. Arul Pragasan.

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Figure 17. a) *Sapium insigne* (Euphorbiaceae); b) *Schefflera stellata* (Araliaceae); c) *Solanum erianthum* (Solanaceae); d) *Streblus taxoides* (Moraceae); e) *Strychnos potatorum* (Loganiaceae); f) *Symplocos cochinchinensis* (Symplocaceae). Photo by L. Arul Pragasan.

LISTS OF SPECIES

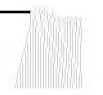
Acknowledgements

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